

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY  
540 S. MORRIS AVE., MONTGOMERY, AL 36115  
GAMMA ANALYSES**

**REPORT OF SAMPLE DELIVERY GROUP #1100245**

Project: Dimock Residential GW Site, Dimock, PA  
 Analysis method: Gamma Spectrometry  
 Report ID: 1100245-GAMMA  
 Report type: Original  
 Date reported: 03/20/2012  
 Total pages in report: 30

**SAMPLES**

NAREL Sample #	Client Sample ID	Location	Matrix	Date Collected	Date Received
B2.01332V	FB09	PA:DIMOCK	WATER-DRINKING	02/02/2012	02/03/2012
B2.01333W	HW42Z	PA:DIMOCK	WATER-DRINKING	02/02/2012	02/03/2012
B2.01455F	HW42	PA:DIMOCK	WATER-DRINKING	02/02/2012	02/03/2012
B2.01456G	HW46	PA:DIMOCK	WATER-DRINKING	02/02/2012	02/03/2012
B2.01457H	HW46-P	PA:DIMOCK	WATER-DRINKING	02/02/2012	02/03/2012
B2.01458J	FB08	PA:DIMOCK	WATER-DRINKING	02/01/2012	02/03/2012
B2.01459K	HW34A	PA:DIMOCK	WATER-DRINKING	02/01/2012	02/03/2012
B2.01460C	HW34A-P	PA:DIMOCK	WATER-DRINKING	02/01/2012	02/03/2012
B2.01461D	HW41	PA:DIMOCK	WATER-DRINKING	02/02/2012	02/06/2012
B2.01462E	HW41-P	PA:DIMOCK	WATER-DRINKING	02/02/2012	02/06/2012
B2.01463F	HW28A	PA:DIMOCK	WATER-DRINKING	02/03/2012	02/06/2012
B2.01464G	HW28A-P	PA:DIMOCK	WATER-DRINKING	02/03/2012	02/06/2012
B2.01490J	HW40	PA:DIMOCK	WATER-DRINKING	02/02/2012	02/06/2012
B2.01491K	HW40-P	PA:DIMOCK	WATER-DRINKING	02/02/2012	02/06/2012
B2.01492L	HW39	PA:DIMOCK	WATER-DRINKING	02/03/2012	02/06/2012
B2.01493M	HW39-P	PA:DIMOCK	WATER-DRINKING	02/03/2012	02/06/2012
B2.01494N	FB10	PA:DIMOCK	WATER-DRINKING	02/03/2012	02/07/2012
B2.01495P	HW09	PA:DIMOCK	WATER-DRINKING	02/03/2012	02/07/2012
B2.01496Q	HW09-P	PA:DIMOCK	WATER-DRINKING	02/03/2012	02/07/2012
B2.01497R	HW28B-P	PA:DIMOCK	WATER-DRINKING	02/03/2012	02/07/2012

**EXCEPTIONS**

1. **Packaging and shipping**—No problems were observed.
2. **Documentation**—No problems were observed.
3. **Sample preparation**—No problems were encountered.
4. **Analysis**— NAREL normally assumes that the radon daughter nuclides Pb-214 and Bi-214 in environmental matrices are in equilibrium with Ra-226 and therefore decay corrects the concentrations of those nuclides using the 1,600 year Ra-226 half life. For this project, the results of gross alpha/beta and radium analysis are inconsistent with that assumption, and the observed decay rate between replicate gamma analyses of the same aliquant performed on different days indicates that the parent contaminant is dissolved radon gas rather than Ra-226. Pb-214 and Bi-214 concentrations in water samples for this project were therefore decay corrected to the time of sample collection using the 3.842 day half life of their parent nuclide, Rn-222. Radon is known to slowly escape from plastic sample containers, therefore the actual concentrations at the time of sampling are likely higher than the measured concentrations. As stated earlier, a replicate analysis on the same sample

performed at a later time would be expected to result in somewhat lower measured Pb-214 and Bi-214 concentrations than the initial analysis.

5. **Holding times**—No holding times were specified.

## QUALITY CONTROL

1. **QC samples**—All QC analysis results met NAREL acceptance criteria.
2. **Instruments**—Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

## CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Director of the Center for Environmental Radioanalytical Laboratory Science and the NAREL Quality Assurance Manager, or their designees, as verified by the following signatures.

for Mary F. Wisdom 3/29/12  
Mary F. Wisdom  
Quality Assurance Manager, NAREL  
Date

for John G. Griggs, Ph.D. 3-29-12  
John G. Griggs, Ph.D.  
Director, Center for Environmental Radioanalytical  
Laboratory Science  
Date

## GENERAL INFORMATION

### SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

### ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Method blank

### QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

### EVALUATION OF QC ANALYSES

A method blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

## **GENERAL INFORMATION (CONTINUED)**

### **GAMMA ANALYSIS**

The reporting format lists the gamma emitters in alphabetical order. The activity, 2-sigma uncertainty, and a sample-specific estimate of the MDC for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected above background with the exception of client requested nuclides of interest. The activity for each of the requested nuclides is reported whether negative, positive, or zero along with the associated 2-sigma uncertainty.

For this group of samples, NAREL used two different gamma analysis software systems. One system provides a sample-specific estimate of the MDC for every sample result. The other does not. The reader can tell which software was used for a particular sample by looking at the column labeled "MDC."

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Bi-214, Pb-214, Th-234, Pa-234m, Ra-226, Th-231, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245**

**ANALYSIS SUMMARY**

Analysis Procedure: NAREL GAM-01  
 Title: Gamma Spectrometry

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Assay Batch #	QC Batch #
B2.01332V		N/A	02/14/2012	0015711D	0008457G
B2.01333W		N/A	02/15/2012	0015711D	0008457G
B2.01455F		N/A	02/15/2012	0015711D	0008457G
B2.01456G		N/A	02/15/2012	0015711D	0008457G
B2.01457H		N/A	02/15/2012	0015711D	0008457G
B2.01458J		N/A	02/16/2012	0015711D	0008457G
B2.01459K		N/A	02/16/2012	0015711D	0008457G
B2.01460C		N/A	02/16/2012	0015711D	0008457G
B2.01461D		N/A	02/16/2012	0015711D	0008457G
B2.01462E		N/A	02/17/2012	0015711D	0008457G
B2.01463F		N/A	02/17/2012	0015711D	0008457G
B2.01464G		N/A	02/17/2012	0015711D	0008457G
B2.01490J		N/A	02/18/2012	0015711D	0008457G
B2.01491K		N/A	02/18/2012	0015711D	0008457G
B2.01492L	DUP	N/A	02/17/2012	0015711D	0008457G
B2.01492L	DUP	N/A	02/22/2012	0015711D	0008457G
B2.01493M		N/A	02/18/2012	0015711D	0008457G
B2.01494N		N/A	02/18/2012	0015711D	0008457G
B2.01495P		N/A	02/18/2012	0015711D	0008457G
B2.01496Q		N/A	02/19/2012	0015711D	0008457G
B2.01497R		N/A	02/19/2012	0015711D	0008457G
LCS-00631055B *	LCS	N/A	02/19/2012	0015711D	0008457G
RBK-00631056C *	RBK	N/A	02/14/2012	0015711D	0008457G

\* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**PREPARATION METHOD(S) USED**

Procedure ID	Title

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
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**SDG #1100245**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01332V	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/14/2012 15:49	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	0.00e+00	1.2e+01	2.1e+01	PCI/L	02/02/2012 10:15 EST
Bi214 *	2.90e+01	2.5e+01	3.2e+01	PCI/L	02/02/2012 10:15 EST
K40	1.08e+00	1.4e+01	1.9e+01	PCI/L	02/02/2012 10:15 EST
Pb214 *	2.77e+00	2.2e+01	3.4e+01	PCI/L	02/02/2012 10:15 EST
Ra226 *	-1.79e+00	3.4e+01	5.1e+01	PCI/L	02/02/2012 10:15 EST
Ra228	2.47e-01	4.0e+00	5.8e+00	PCI/L	02/02/2012 10:15 EST
Th234	-5.20e+01	3.9e+02	2.5e+02	PCI/L	02/02/2012 10:15 EST
Tl208	1.09e+00	1.2e+00	1.6e+00	PCI/L	02/02/2012 10:15 EST
U235 *	-4.58e+00	1.0e+01	1.6e+01	PCI/L	02/02/2012 10:15 EST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
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**SDG #1100245**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01333W	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/14/2012 20:51	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	9.68e-01	1.2e+01	2.1e+01	PCI/L	02/02/2012 10:29 EST
Bi214 *	1.85e+02	3.5e+01	3.4e+01	PCI/L	02/02/2012 10:29 EST
K40	-1.58e+01	2.2e+01	1.9e+01	PCI/L	02/02/2012 10:29 EST
Pb214 *	2.08e+02	4.0e+01	4.0e+01	PCI/L	02/02/2012 10:29 EST
Ra226 *	-1.36e+01	8.5e+01	5.3e+01	PCI/L	02/02/2012 10:29 EST
Ra228	-1.50e+00	4.4e+00	5.5e+00	PCI/L	02/02/2012 10:29 EST
Th234	-3.52e+01	3.0e+02	2.7e+02	PCI/L	02/02/2012 10:29 EST
U235 *	-3.00e+00	1.2e+01	1.8e+01	PCI/L	02/02/2012 10:29 EST

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**SDG #1100245**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01455F	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/15/2012 01:52	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Bi212	5.19e+00	1.2e+01	2.1e+01	PCI/L	02/02/2012 10:28 EST
Bi214 *	2.40e+02	4.3e+01	3.7e+01	PCI/L	02/02/2012 10:28 EST
K40	-8.84e-01	1.4e+01	2.0e+01	PCI/L	02/02/2012 10:28 EST
Pb214 *	2.40e+02	4.5e+01	4.4e+01	PCI/L	02/02/2012 10:28 EST
Ra226 *	-1.80e+01	1.4e+02	5.4e+01	PCI/L	02/02/2012 10:28 EST
Ra228	-2.54e+00	7.3e+00	6.2e+00	PCI/L	02/02/2012 10:28 EST
Th234	-1.29e+02	3.1e+03	2.9e+02	PCI/L	02/02/2012 10:28 EST
Tl208	1.23e+00	1.1e+00	1.6e+00	PCI/L	02/02/2012 10:28 EST
U235 *	-3.73e-01	2.3e+01	1.9e+01	PCI/L	02/02/2012 10:28 EST

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**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01456G	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/15/2012 10:22	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	1.04e+01	1.2e+01	2.0e+01	PCI/L	02/02/2012 11:39 EST
Bi214 *	2.47e+02	4.4e+01	3.8e+01	PCI/L	02/02/2012 11:39 EST
K40	1.13e+01	1.2e+01	1.8e+01	PCI/L	02/02/2012 11:39 EST
Pb214 *	2.59e+02	4.6e+01	4.4e+01	PCI/L	02/02/2012 11:39 EST
Ra226 *	-1.14e+01	7.2e+01	5.4e+01	PCI/L	02/02/2012 11:39 EST
Ra228	2.29e+00	3.1e+00	5.7e+00	PCI/L	02/02/2012 11:39 EST
Th234	-1.28e+02	3.5e+03	2.8e+02	PCI/L	02/02/2012 11:39 EST
U235 *	-1.03e+00	1.4e+01	1.8e+01	PCI/L	02/02/2012 11:39 EST

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**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245  
SAMPLE ANALYSIS REPORT**

Sample #:	B2.01457H	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/15/2012 15:24	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Bi212	3.24e+00	1.2e+01	2.1e+01	PCI/L	02/02/2012 11:24 EST
Bi214 *	2.65e+02	4.3e+01	3.8e+01	PCI/L	02/02/2012 11:24 EST
K40	1.18e+01	1.2e+01	1.8e+01	PCI/L	02/02/2012 11:24 EST
Pa234m	7.26e+01	8.2e+01	1.3e+02	PCI/L	02/02/2012 11:24 EST
Pb214 *	3.00e+02	5.5e+01	5.0e+01	PCI/L	02/02/2012 11:24 EST
Ra226 *	-6.16e+00	4.9e+01	5.5e+01	PCI/L	02/02/2012 11:24 EST
Ra228	8.55e-01	2.8e+00	4.9e+00	PCI/L	02/02/2012 11:24 EST
Th234	-7.61e+01	7.7e+02	2.9e+02	PCI/L	02/02/2012 11:24 EST
U235 *	1.16e+01	1.1e+01	1.8e+01	PCI/L	02/02/2012 11:24 EST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01458J	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/15/2012 20:26	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	6.65e-01	1.3e+01	2.2e+01	PCI/L	02/01/2012 14:45 EST
Bi214 *	5.99e+01	3.2e+01	4.4e+01	PCI/L	02/01/2012 14:45 EST
K40	7.25e+00	1.1e+01	1.7e+01	PCI/L	02/01/2012 14:45 EST
Pb214 *	2.54e+01	3.6e+01	5.2e+01	PCI/L	02/01/2012 14:45 EST
Ra226 *	-4.11e+00	3.9e+01	5.1e+01	PCI/L	02/01/2012 14:45 EST
Ra228	6.10e-01	3.6e+00	5.5e+00	PCI/L	02/01/2012 14:45 EST
Th234	-9.71e+01	1.4e+03	2.8e+02	PCI/L	02/01/2012 14:45 EST
U235 *	-6.84e+00	1.1e+01	1.7e+01	PCI/L	02/01/2012 14:45 EST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01459K	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/16/2012 01:28	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	4.60e+00	1.2e+01	2.0e+01	PCI/L	02/01/2012 15:47 EST
Bi214 *	3.10e+02	5.8e+01	5.4e+01	PCI/L	02/01/2012 15:47 EST
K40	-9.70e-02	1.2e+01	1.9e+01	PCI/L	02/01/2012 15:47 EST
Pb214 *	3.36e+02	6.6e+01	6.4e+01	PCI/L	02/01/2012 15:47 EST
Ra226 *	2.03e+00	3.1e+01	5.3e+01	PCI/L	02/01/2012 15:47 EST
Ra228	-7.49e-01	4.1e+00	5.4e+00	PCI/L	02/01/2012 15:47 EST
Th234	-1.25e+02	1.6e+04	2.8e+02	PCI/L	02/01/2012 15:47 EST
U235 *	-1.70e+00	1.3e+01	1.9e+01	PCI/L	02/01/2012 15:47 EST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01460C	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/16/2012 10:36	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	0.00e+00	1.2e+01	2.0e+01	PCI/L	02/01/2012 15:55 EST
Bi214 *	1.01e+02	3.6e+01	4.9e+01	PCI/L	02/01/2012 15:55 EST
K40	6.90e+00	1.3e+01	1.9e+01	PCI/L	02/01/2012 15:55 EST
Pb214 *	9.59e+01	4.1e+01	5.6e+01	PCI/L	02/01/2012 15:55 EST
Ra226 *	5.00e+00	3.0e+01	5.1e+01	PCI/L	02/01/2012 15:55 EST
Ra228	-1.52e+00	4.7e+00	5.7e+00	PCI/L	02/01/2012 15:55 EST
Th234	-1.48e+02	1.9e+03	3.0e+02	PCI/L	02/01/2012 15:55 EST
U235 *	-3.99e+00	1.2e+01	1.9e+01	PCI/L	02/01/2012 15:55 EST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245  
SAMPLE ANALYSIS REPORT**

Sample #:	B2.01461D	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/16/2012 15:38	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	1.24e-03	1.3e+01	2.2e+01	PCI/L	02/02/2012 16:12 EST
Bi214 *	6.51e+02	8.6e+01	4.8e+01	PCI/L	02/02/2012 16:12 EST
K40	-3.35e+00	1.6e+01	2.0e+01	PCI/L	02/02/2012 16:12 EST
Pb214 *	7.21e+02	9.6e+01	5.6e+01	PCI/L	02/02/2012 16:12 EST
Ra226 *	4.42e+00	3.2e+01	5.5e+01	PCI/L	02/02/2012 16:12 EST
Ra228	3.02e+00	4.0e+00	5.6e+00	PCI/L	02/02/2012 16:12 EST
Th234	-1.54e+01	2.2e+02	2.9e+02	PCI/L	02/02/2012 16:12 EST
U235 *	1.93e+00	9.4e+00	1.6e+01	PCI/L	02/02/2012 16:12 EST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01462E	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/16/2012 20:40	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	3.90e+00	1.4e+01	2.3e+01	PCI/L	02/02/2012 15:54 EST
Bi214 *	6.78e+02	8.9e+01	4.9e+01	PCI/L	02/02/2012 15:54 EST
K40	-9.90e+00	1.6e+01	1.9e+01	PCI/L	02/02/2012 15:54 EST
Pb214 *	7.10e+02	1.0e+02	6.7e+01	PCI/L	02/02/2012 15:54 EST
Ra226 *	1.25e+01	3.3e+01	5.5e+01	PCI/L	02/02/2012 15:54 EST
Ra228	-1.43e-01	3.3e+00	6.0e+00	PCI/L	02/02/2012 15:54 EST
Th234	-1.04e+02	2.3e+03	3.1e+02	PCI/L	02/02/2012 15:54 EST
U235 *	-5.02e+00	1.2e+01	2.0e+01	PCI/L	02/02/2012 15:54 EST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01463F	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/17/2012 11:41	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Bi212	2.78e-01	1.3e+01	2.2e+01	PCI/L	02/03/2012 11:49 EST
Bi214 *	4.38e+02	6.5e+01	4.7e+01	PCI/L	02/03/2012 11:49 EST
K40	4.62e+00	1.3e+01	2.0e+01	PCI/L	02/03/2012 11:49 EST
Pa234m	8.54e+01	9.0e+01	1.5e+02	PCI/L	02/03/2012 11:49 EST
Pb214 *	4.38e+02	6.7e+01	5.4e+01	PCI/L	02/03/2012 11:49 EST
Ra226 *	1.39e+00	3.2e+01	5.4e+01	PCI/L	02/03/2012 11:49 EST
Ra228	1.70e+00	4.1e+00	5.9e+00	PCI/L	02/03/2012 11:49 EST
Th234	-7.52e+01	7.8e+02	3.1e+02	PCI/L	02/03/2012 11:49 EST
U235 *	2.03e+00	1.1e+01	1.9e+01	PCI/L	02/03/2012 11:49 EST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245  
SAMPLE ANALYSIS REPORT**

Sample #:	B2.01464G	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/17/2012 16:43	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	-2.04e+00	1.2e+01	2.1e+01	PCI/L	02/03/2012 11:52 EST
Bi214 *	3.51e+02	6.0e+01	5.1e+01	PCI/L	02/03/2012 11:52 EST
K40	7.40e+00	1.3e+01	1.9e+01	PCI/L	02/03/2012 11:52 EST
Pb214 *	4.07e+02	6.7e+01	5.7e+01	PCI/L	02/03/2012 11:52 EST
Ra226 *	-4.06e+00	4.2e+01	5.4e+01	PCI/L	02/03/2012 11:52 EST
Ra228	1.99e+00	3.6e+00	5.4e+00	PCI/L	02/03/2012 11:52 EST
Th234	-1.37e+02	2.4e+03	2.5e+02	PCI/L	02/03/2012 11:52 EST
U235 *	-6.33e+00	1.2e+01	1.9e+01	PCI/L	02/03/2012 11:52 EST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245  
SAMPLE ANALYSIS REPORT**

Sample #:	B2.01490J	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/17/2012 21:45	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	2.08e+00	1.2e+01	2.1e+01	PCI/L	02/02/2012 15:39 EST
Bi214 *	5.90e+02	8.4e+01	5.9e+01	PCI/L	02/02/2012 15:39 EST
K40	-3.72e+00	1.6e+01	2.0e+01	PCI/L	02/02/2012 15:39 EST
Pa234m	1.14e+02	8.9e+01	1.4e+02	PCI/L	02/02/2012 15:39 EST
Pb214 *	6.57e+02	9.9e+01	7.3e+01	PCI/L	02/02/2012 15:39 EST
Ra226 *	-1.13e+01	7.4e+01	5.5e+01	PCI/L	02/02/2012 15:39 EST
Ra228	-2.22e+00	6.5e+00	6.2e+00	PCI/L	02/02/2012 15:39 EST
Th234	-1.56e+02	1.7e+03	3.2e+02	PCI/L	02/02/2012 15:39 EST
U235 *	-3.87e+00	1.2e+01	1.9e+01	PCI/L	02/02/2012 15:39 EST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245  
SAMPLE ANALYSIS REPORT**

Sample #:	B2.01491K	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/18/2012 02:47	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Bi212	2.56e+00	1.3e+01	2.3e+01	PCI/L	02/02/2012 15:44 EST
Bi214 *	7.44e+02	1.0e+02	6.0e+01	PCI/L	02/02/2012 15:44 EST
K40	4.36e+00	1.3e+01	1.9e+01	PCI/L	02/02/2012 15:44 EST
Pb214 *	7.83e+02	1.1e+02	7.7e+01	PCI/L	02/02/2012 15:44 EST
Ra226 *	-6.23e+00	5.1e+01	5.6e+01	PCI/L	02/02/2012 15:44 EST
Ra228	1.45e-01	3.2e+00	6.1e+00	PCI/L	02/02/2012 15:44 EST
Th234	-4.65e+01	4.1e+02	3.2e+02	PCI/L	02/02/2012 15:44 EST
U235 *	-6.29e+00	1.2e+01	2.0e+01	PCI/L	02/02/2012 15:44 EST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245  
SAMPLE ANALYSIS REPORT**

Sample #:	B2.01492L	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/17/2012 01:41	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	-5.77e-02	1.2e+01	2.1e+01	PCI/L	02/03/2012 10:42 EST
Bi214 *	4.90e+02	6.8e+01	4.4e+01	PCI/L	02/03/2012 10:42 EST
K40	1.19e+01	1.2e+01	1.9e+01	PCI/L	02/03/2012 10:42 EST
Pa234m	7.43e+01	8.8e+01	1.4e+02	PCI/L	02/03/2012 10:42 EST
Pb214 *	4.48e+02	7.2e+01	5.8e+01	PCI/L	02/03/2012 10:42 EST
Ra226 *	2.30e+01	2.9e+01	4.5e+01	PCI/L	02/03/2012 10:42 EST
Ra228	1.98e+00	3.3e+00	6.0e+00	PCI/L	02/03/2012 10:42 EST
Th234	-8.65e+01	1.1e+03	3.1e+02	PCI/L	02/03/2012 10:42 EST
Tl208	1.17e+00	1.2e+00	1.7e+00	PCI/L	02/03/2012 10:42 EST
U235 *	1.55e+00	1.2e+01	1.9e+01	PCI/L	02/03/2012 10:42 EST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01492L	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	DUP
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/21/2012 13:25	1000.0	GE04	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	1.59e+01	1.9e+01	3.0e+01	PCI/L	02/03/2012 10:42 EST
Bi214 *	3.38e+02	1.2e+02	1.5e+02	PCI/L	02/03/2012 10:42 EST
K40	-2.40e-01	2.1e+01	3.3e+01	PCI/L	02/03/2012 10:42 EST
Pb214 *	3.37e+02	8.9e+01	1.3e+02	PCI/L	02/03/2012 10:42 EST
Ra226 *	-1.91e+00	3.4e+01	5.5e+01	PCI/L	02/03/2012 10:42 EST
Ra228	2.90e+00	5.9e+00	8.6e+00	PCI/L	02/03/2012 10:42 EST
Th234	-7.39e+00	6.2e+01	1.0e+02	PCI/L	02/03/2012 10:42 EST
U235 *	7.04e+00	8.3e+00	1.4e+01	PCI/L	02/03/2012 10:42 EST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245  
SAMPLE ANALYSIS REPORT**

Sample #:	B2.01493M	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/18/2012 07:49	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	-8.17e-03	1.3e+01	2.1e+01	PCI/L	02/03/2012 11:13 EST
Bi214 *	1.04e+02	4.4e+01	5.5e+01	PCI/L	02/03/2012 11:13 EST
K40	9.58e+00	1.3e+01	1.9e+01	PCI/L	02/03/2012 11:13 EST
Pb214 *	1.05e+02	4.8e+01	6.2e+01	PCI/L	02/03/2012 11:13 EST
Ra226 *	-9.30e+00	5.8e+01	5.1e+01	PCI/L	02/03/2012 11:13 EST
Ra228	2.27e+00	4.1e+00	5.7e+00	PCI/L	02/03/2012 11:13 EST
Th234	-1.21e+02	1.4e+04	2.7e+02	PCI/L	02/03/2012 11:13 EST
U235 *	-6.28e+00	1.1e+01	1.8e+01	PCI/L	02/03/2012 11:13 EST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245  
SAMPLE ANALYSIS REPORT**

Sample #:	B2.01494N	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/18/2012 12:51	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	-1.11e+01	1.4e+01	2.3e+01	PCI/L	02/03/2012 14:09 EST
Bi214 *	3.04e+01	3.2e+01	5.1e+01	PCI/L	02/03/2012 14:09 EST
K40	-5.24e+00	1.4e+01	1.9e+01	PCI/L	02/03/2012 14:09 EST
Pb214 *	4.21e+01	4.7e+01	6.5e+01	PCI/L	02/03/2012 14:09 EST
Ra226 *	-1.16e+01	7.0e+01	5.1e+01	PCI/L	02/03/2012 14:09 EST
Ra228	8.22e-01	2.9e+00	5.0e+00	PCI/L	02/03/2012 14:09 EST
Th234	-1.14e+02	3.2e+03	2.4e+02	PCI/L	02/03/2012 14:09 EST
U235 *	3.57e+00	1.1e+01	1.8e+01	PCI/L	02/03/2012 14:09 EST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245  
SAMPLE ANALYSIS REPORT**

Sample #:	B2.01495P	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/18/2012 17:52	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	4.81e-03	1.2e+01	2.0e+01	PCI/L	02/03/2012 15:20 EST
Bi214 *	3.88e+02	6.5e+01	5.7e+01	PCI/L	02/03/2012 15:20 EST
K40	4.68e+00	1.3e+01	1.9e+01	PCI/L	02/03/2012 15:20 EST
Pb214 *	4.15e+02	8.0e+01	7.5e+01	PCI/L	02/03/2012 15:20 EST
Ra226 *	-6.04e+00	4.8e+01	5.3e+01	PCI/L	02/03/2012 15:20 EST
Ra228	1.52e-01	3.4e+00	6.3e+00	PCI/L	02/03/2012 15:20 EST
Th234	-1.34e+02	4.5e+03	2.7e+02	PCI/L	02/03/2012 15:20 EST
U235 *	2.46e+00	1.1e+01	1.9e+01	PCI/L	02/03/2012 15:20 EST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100245

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01496Q	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/18/2012 22:54	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	1.65e-01	1.2e+01	2.0e+01	PCI/L	02/03/2012 15:16 EST
Bi214 *	1.74e+02	5.5e+01	6.2e+01	PCI/L	02/03/2012 15:16 EST
K40	1.20e+01	1.3e+01	1.9e+01	PCI/L	02/03/2012 15:16 EST
Pb214 *	1.55e+02	5.9e+01	7.2e+01	PCI/L	02/03/2012 15:16 EST
Ra226 *	-3.44e+00	3.9e+01	5.2e+01	PCI/L	02/03/2012 15:16 EST
Ra228	-1.90e+00	5.8e+00	6.2e+00	PCI/L	02/03/2012 15:16 EST
Th234	-1.53e+02	1.8e+03	3.1e+02	PCI/L	02/03/2012 15:16 EST
U235 *	-7.96e+00	1.1e+01	1.8e+01	PCI/L	02/03/2012 15:16 EST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01497R	QC batch #:	0008457G
Matrix:	WATER-DRINKING	Assay batch #:	0015711D
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/19/2012 03:56	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	2.97e-01	1.2e+01	2.1e+01	PCI/L	02/03/2012 14:27 EST
Bi214 *	4.08e+02	7.0e+01	6.2e+01	PCI/L	02/03/2012 14:27 EST
K40	-1.24e+01	1.7e+01	1.9e+01	PCI/L	02/03/2012 14:27 EST
Pa234m	9.19e+01	9.9e+01	1.6e+02	PCI/L	02/03/2012 14:27 EST
Pb214 *	4.68e+02	8.1e+01	7.3e+01	PCI/L	02/03/2012 14:27 EST
Ra226 *	-2.91e+00	3.8e+01	5.3e+01	PCI/L	02/03/2012 14:27 EST
Ra228	2.53e+00	3.7e+00	5.5e+00	PCI/L	02/03/2012 14:27 EST
Th234	-6.07e+01	5.3e+02	3.2e+02	PCI/L	02/03/2012 14:27 EST
U235 *	-4.77e+00	1.2e+01	1.9e+01	PCI/L	02/03/2012 14:27 EST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245  
SAMPLE ANALYSIS REPORT**

Sample #:	LCS-00631055B	QC batch #:	0008457G
Matrix:	N/A	Assay batch #:	0015711D
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	LCS
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/19/2012 08:58	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi207	3.69e+03	4.0e+02	1.1e+01	PCI	12/15/2010 11:00 CST
Bi212	-5.77e+01	1.0e+02	1.7e+02	PCI	12/15/2010 11:00 CST
Bi214	-2.76e+00	1.8e+01	2.1e+01	PCI	12/15/2010 11:00 CST
Eu155	8.80e+02	1.2e+02	7.8e+01	PCI	12/15/2010 11:00 CST
K40	1.39e+02	6.6e+01	7.7e+01	PCI	12/15/2010 11:00 CST
Pb214 *	4.84e+00	2.1e+01	3.5e+01	PCI	12/15/2010 11:00 CST
Ra226	-8.87e+01	1.6e+04	3.7e+02	PCI	12/15/2010 11:00 CST
Ra228	3.40e+00	2.7e+01	4.7e+01	PCI	12/15/2010 11:00 CST
U235	-2.75e+01	7.1e+01	1.1e+02	PCI	12/15/2010 11:00 CST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100245  
SAMPLE ANALYSIS REPORT**

Sample #:	RBK-00631056C	QC batch #:	0008457G
Matrix:	N/A	Assay batch #:	0015711D
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	RBK
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/14/2012 10:47	300.0	GE14	MO

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Bi212	2.10e+01	3.6e+01	6.0e+01	PCI	02/14/2012 07:00 CST
Bi214 *	1.82e+01	9.7e+00	1.2e+01	PCI	02/14/2012 07:00 CST
K40	-3.80e+01	4.6e+01	5.3e+01	PCI	02/14/2012 07:00 CST
Pb214 *	2.71e+01	9.6e+00	1.2e+01	PCI	02/14/2012 07:00 CST
Ra226 *	1.02e+01	8.5e+01	1.5e+02	PCI	02/14/2012 07:00 CST
Ra228	1.44e+00	1.1e+01	1.6e+01	PCI	02/14/2012 07:00 CST
Th234	-2.26e+02	6.7e+03	4.4e+02	PCI	02/14/2012 07:00 CST
Tl208	3.72e+00	3.8e+00	5.1e+00	PCI	02/14/2012 07:00 CST
U235 *	1.15e+01	2.9e+01	4.8e+01	PCI	02/14/2012 07:00 CST

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG 1100245**

**QC BATCH SUMMARY**

QC batch #: 0008457G

Preparation procedure: N/A

Analysis procedure: NAREL GAM-01

NAREL Sample #	QC Type	Yield (%)	± 2 σ Uncertainty (%)	Analyst
B2.01332V		N/A		RCL
B2.01333W		N/A		RCL
B2.01455F		N/A		RCL
B2.01456G		N/A		RCL
B2.01457H		N/A		RCL
B2.01458J		N/A		RCL
B2.01459K		N/A		RCL
B2.01460C		N/A		RCL
B2.01461D		N/A		RCL
B2.01462E		N/A		RCL
B2.01463F		N/A		RCL
B2.01464G		N/A		RCL
B2.01490J		N/A		RCL
B2.01491K		N/A		RCL
B2.01492L		N/A		RCL
B2.01492L	DUP	N/A		RCL
B2.01493M		N/A		RCL
B2.01494N		N/A		RCL
B2.01495P		N/A		RCL
B2.01496Q		N/A		RCL
B2.01497R		N/A		RCL
LCS-00631055B *	LCS	N/A		RCL
RBK-00631056C *	RBK	N/A		RCL

\* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory  
QC Batch Report

QC Batch #: 0008457G

Analytical Method: NAREL GAM-01

METHOD BLANKS (PCI)

Sample ID	Nuclide	Activity $\pm 2\sigma$	Prep Date	Flags
00631056C	BI212	2.10e+01 $\pm$ 3.6e+01	2012-02-14	OK
00631056C	BI214	1.82e+01 $\pm$ 9.7e+00	2012-02-14	J
00631056C	K40	-3.80e+01 $\pm$ 4.6e+01	2012-02-14	OK
00631056C	PB214	2.71e+01 $\pm$ 9.6e+00	2012-02-14	J
00631056C	RA226	1.02e+01 $\pm$ 8.5e+01	2012-02-14	J
00631056C	RA228	1.44e+00 $\pm$ 1.1e+01	2012-02-14	OK
00631056C	TH234	-2.26e+02 $\pm$ 6.7e+03	2012-02-14	OK
00631056C	TL208	3.72e+00 $\pm$ 3.8e+00	2012-02-14	OK
00631056C	U235	1.15e+01 $\pm$ 2.9e+01	2012-02-14	J

LABORATORY DUPLICATES (PCI/L)

Sample ID	Nuclide	Original $\pm 2\sigma$	Duplicate $\pm 2\sigma$	RPD	Z
B2.01492L	BI212	-5.77e-02 $\pm$ 1.2e+01	1.59e+01 $\pm$ 1.9e+01	201.45	1.45 OK
B2.01492L	BI214	4.90e+02 $\pm$ 6.8e+01	3.38e+02 $\pm$ 1.2e+02	36.53	-2.20 OK
B2.01492L	K40	1.19e+01 $\pm$ 1.2e+01	-2.40e-01 $\pm$ 2.1e+01	208.22	-1.01 OK
B2.01492L	PB214	4.48e+02 $\pm$ 7.2e+01	3.37e+02 $\pm$ 8.9e+01	28.21	-1.94 OK
B2.01492L	RA226	2.30e+01 $\pm$ 2.9e+01	-1.91e+00 $\pm$ 3.4e+01	236.34	-1.11 OK
B2.01492L	RA228	1.98e+00 $\pm$ 3.3e+00	2.90e+00 $\pm$ 5.9e+00	37.38	0.27 OK
B2.01492L	TH234	-8.65e+01 $\pm$ 1.1e+03	-7.39e+00 $\pm$ 6.2e+01	0.00	0.14 OK
B2.01492L	U235	1.55e+00 $\pm$ 1.2e+01	7.04e+00 $\pm$ 8.3e+00	127.85	0.77 OK

LAB CONTROL SAMPLES (PCI)

Sample ID	Nuclide	Amt Added $\pm 2\sigma$	Measured $\pm 2\sigma$	%R	Z
00631055B	BI207	3.95e+03 $\pm$ 3.9%	3.69e+03 $\pm$ 4.0e+02	93.47	-1.20 OK
00631055B	BI212	NO SPIKE DATA			
00631055B	BI214	NO SPIKE DATA			
00631055B	EU155	8.57e+02 $\pm$ 5.7%	8.80e+02 $\pm$ 1.2e+02	102.72	0.37 OK
00631055B	K40	NO SPIKE DATA			
00631055B	PB214	NO SPIKE DATA			
00631055B	RA226	NO SPIKE DATA			
00631055B	RA228	NO SPIKE DATA			
00631055B	U235	NO SPIKE DATA			

Analyst:

R. Michael Davis 2/27/12  
R. C. Young 2-27-12

QA Officer:

Lindley McEwan 2/28/12

with estimated results included. Kom 2/28/12